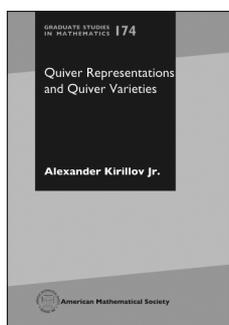


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Algebra and Algebraic Geometry



Quiver Representations and Quiver Varieties

Alexander Kirillov Jr., *Stony Brook University, NY*

This book is an introduction to the theory of quiver representations and quiver varieties, starting with basic definitions and ending with Nakajima's work on quiver varieties and the geometric realization of Kac-Moody Lie algebras.

The first part of the book is devoted to the classical theory of quivers of finite type. Here the exposition is mostly self-contained and all important proofs are presented in detail. The second part contains the more recent topics of quiver theory that are related to quivers of infinite type: Coxeter functor, tame and wild quivers, McKay correspondence, and representations of Euclidean quivers. In the third part, topics related to geometric aspects of quiver theory are discussed, such as quiver varieties, Hilbert schemes, and the geometric realization of Kac-Moody algebras. Here some of the more technical proofs are omitted; instead only the statements and some ideas of the proofs are given, and the reader is referred to original papers for details.

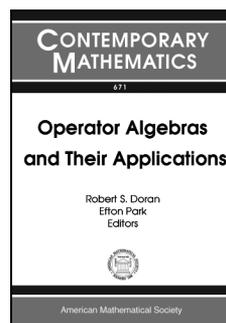
The exposition in the book requires only a basic knowledge of algebraic geometry, differential geometry, and the theory of Lie groups and Lie algebras. Some sections use the language of derived categories; however, the use of this language is reduced to a minimum. The many examples make the book accessible to graduate students who want to learn about quivers, their representations, and their relations to algebraic geometry and Lie algebras.

Contents: *Dynkin quivers:* Basic theory; Geometry of orbits; Gabriel's theorem; Hall algebras; Double quivers; *Quivers of infinite type:* Coxeter functor and preprojective representations; Tame and wild quivers; McKay correspondence and representations of Euclidean quivers; *Quiver varieties:* Hamiltonian reduction and geometric invariant theory; Quiver varieties; Jordan quiver and Hilbert schemes; Kleinian singularities and geometric McKay correspondence; Geometric realization of Kac-Moody Lie algebras; Kac-Moody algebras and Weyl groups; Bibliography; Index.

Graduate Studies in Mathematics, Volume 174

October 2016, 295 pages, Hardcover, ISBN: 978-1-4704-2307-0, LC 2016018803, 2010 *Mathematics Subject Classification:* 16G20; 14C05, 14D21, 16G60, 16G70, 17B10, 17B22, 17B67, **AMS members US\$71.20**, List US\$89, Order code GSM/174

Analysis



Operator Algebras and Their Applications

A Tribute to Richard V. Kadison

Robert S. Doran, *Texas Christian University, Ft. Worth, TX*, and Efton Park, *Texas Christian University, Ft. Worth, TX*, Editors

This volume contains the proceedings of the AMS Special Session *Operator Algebras and Their Applications: A Tribute to Richard V. Kadison*, held from January 10-11, 2015, in San Antonio, Texas.

Richard V. Kadison has been a towering figure in the study of operator algebras for more than 65 years. His research and leadership in the field have been fundamental in the development of the subject, and his influence continues to be felt through his work and the work of his many students, collaborators, and mentees.

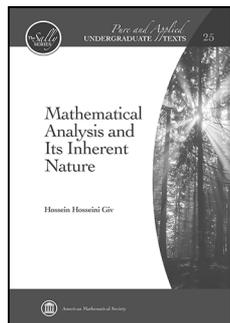
Among the topics addressed in this volume are the Kadison-Kaplansky conjecture, classification of C^* -algebras, connections between operator spaces and parabolic induction, spectral flow, C^* -algebra actions, von Neumann algebras, and applications to mathematical physics.

Contents: P. Baum, E. Guentner, and R. Willett, Exactness and the Kadison-Kaplansky conjecture; D. P. Blecher, Generalization of C^* -algebra methods via real positivity for operator and Banach algebras; E. Christensen, Higher weak derivatives and reflexive algebras of operators; T. Crisp and N. Higson, Parabolic induction, categories of representations and operator spaces; R. G. Douglas and J. Kaminker, Spectral multiplicity and odd K-theory-II; G. A. Elliott and Z. Niu, On the classification of simple amenable C^* -algebras with finite decomposition rank; L. Ge, Topology of natural numbers and entropy of arithmetic functions; S. Kaliszewski, M. B. Landstad, and

J. Quigg, Properness conditions for actions and coactions; **Z. Liu**, Reflexivity of Murray-von Neumann algebras; **F. Pop** and **R. R. Smith**, Hochschild cohomology for tensor products of factors; **S. Popa** and **S. Vaes**, On the optimal paving over MASAs in von Neumann algebras; **M. A. Rieffel**, Matricial bridges for "Matrix algebras converge to the sphere"; **J. Rosenberg**, Structure and applications of real C^* -algebras; **E. Størmer**, Separable states, maximally entangled states, and positive maps.

Contemporary Mathematics, Volume 671

September 2016, 267 pages, Softcover, ISBN: 978-1-4704-1948-6, LC 2015043280, 2010 *Mathematics Subject Classification*: 46L05, 46L10, 46L35, 46L55, 46L87, 19K56, 22E45, **AMS members US\$86.40**, List US\$108, Order code CONM/671



Mathematical Analysis and Its Inherent Nature

Hossein Hosseini Giv, *University of Sistan and Baluchestan, Zahedan, Iran*

Mathematical analysis is often referred to as *generalized calculus*. But it is much more than that. This book has been written in the belief that emphasizing the inherent nature of a mathematical discipline helps

students to understand it better. With this in mind, and focusing on the essence of analysis, the text is divided into two parts based on the way they are related to calculus: *completion and abstraction*. The first part describes those aspects of analysis which complete a corresponding area of calculus theoretically, while the second part concentrates on the way analysis generalizes some aspects of calculus to a more general framework. Presenting the contents in this way has an important advantage: students first learn the most important aspects of analysis on the classical space \mathbb{R} and then fill in the gaps of their calculus-based knowledge. Then they proceed to a step-by-step development of an abstract theory, namely, the theory of metric spaces which explores such crucial notions as limit, continuity, and convergence in a wider context.

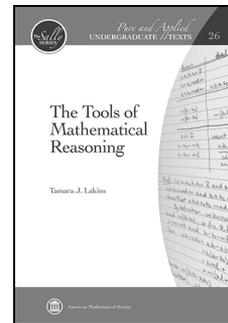
The readers are assumed to have passed courses in one- and several-variable calculus and an elementary course on the foundations of mathematics. A large variety of exercises and the inclusion of informal interpretations of many results and examples will greatly facilitate the reader's study of the subject.

Contents: *Rebuilding the calculus building:* The real number system revisited; Sequences and series of real numbers; Limit and continuity of real functions; Derivative and differentiation; The Riemann integral; *Abstraction and generalization:* Basic theory of metric spaces; Sequences in general metric spaces; Limit and continuity of functions in metric spaces; Sequences and series of functions; Appendix; Bibliography; Index.

Pure and Applied Undergraduate Texts, Volume 25

September 2016, approximately 351 pages, Hardcover, ISBN: 978-1-4704-2807-5, 2010 *Mathematics Subject Classification*: 26A06, 54E35, 54E45, 54E50, **AMS members US\$71.20**, List US\$89, Order code AMSTEXT/25

Logic and Foundations



The Tools of Mathematical Reasoning

Tamara J. Lakins, *Allegheny College, Meadville, PA*

This accessible textbook gives beginning undergraduate mathematics students a first exposure to introductory logic, proofs, sets, functions, number theory, relations, finite and infinite sets, and the foundations of analysis. The book provides students

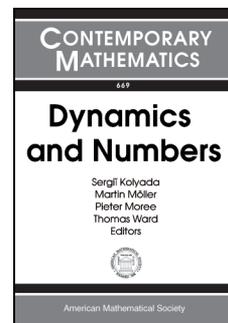
with a quick path to writing proofs and a practical collection of tools that they can use in later mathematics courses such as abstract algebra and analysis. The importance of the logical structure of a mathematical statement as a framework for finding a proof of that statement, and the proper use of variables, is an early and consistent theme used throughout the book.

Contents: Language, logic, and proof; Techniques of proof; Induction; Sets; Functions; An introduction to number theory; Equivalence relations and partitions; Finite and infinite sets; Foundations of analysis; Writing mathematics; Bibliography; Index.

Pure and Applied Undergraduate Texts, Volume 26

October 2016, 217 pages, Hardcover, ISBN: 978-1-4704-2899-0, LC 2016021930, 2010 *Mathematics Subject Classification*: 00-01, **AMS members US\$55.20**, List US\$69, Order code AMSTEXT/26

Number Theory



Dynamics and Numbers

Sergii Kolyada, *National Academy of Sciences of Ukraine, Kiev, Ukraine*, **Martin Möller**, *Frankfurt University, Germany*, **Pieter Moree**, *Max-Planck Institute for Mathematics, Bonn, Germany*, and **Thomas Ward**, *Durham University, United Kingdom*, Editors

This volume contains a collection of survey and research articles from the special program and international conference on Dynamics and Numbers held at the Max-Planck Institute for Mathematics in Bonn, Germany in 2014.

The papers reflect the great diversity and depth of the interaction between number theory and dynamical systems and geometry in particular. Topics covered in this volume include symbolic dynamics, Bratelli diagrams, geometry of laminations, entropy, Nielsen theory, recurrence, topology of the moduli space of interval maps, and specification properties.

This item will also be of interest to those working in geometry and topology.

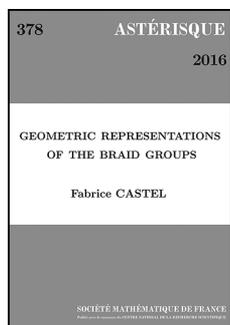
Contents: S. Bezuglyi and O. Karpel, Bratteli diagrams: Structure, measures, dynamics; A. Blokh, L. Oversteegen, R. Ptacek, and V. Timorin, The combinatorial Mandelbrot set as the quotient of the space of geolaminations; T. Downarowicz, B. Frej, and P.-P. Romagnoli, Shearer's inequality and infimum rule for Shannon entropy and topological entropy; A. Fel'shtyn and J. B. Lee, The Nielsen and Reidemeister theories of iterations on infra-solvmanifolds of type (R) and poly-Bieberbach groups; M. Gröger and T. Jäger, Some remarks on modified power entropy; W. Huang and X. Zhou, Recurrent sets, entropy and independence; S. Kolyada, M. Misiurewicz, and L. Snoha, Loops of transitive interval maps; D. Kwietniak, M. Łącka, and P. Oprocha, A panorama of specification-like properties and their consequences; A. Ostafe and M. Sha, Counting dynamical systems over finite fields; A. D. Pohl, Symbolic dynamics, automorphic functions, and Selberg zeta functions with unitary representations; V. Schroeder and S. Weil, The aperiodic complexities and connections to dimensions and Diophantine approximation; I. E. Shparlinski, Dynamical systems of non-algebraic origin: Fixed points and orbit lengths; S. Stevens, T. Ward, and S. Zegowitz, Halving dynamical systems; Z. Wang and G. Zhang, Chaotic behavior of group actions.

Contemporary Mathematics, Volume 669

August 2016, 315 pages, Softcover, ISBN: 978-1-4704-2020-8, LC 2015041442, 2010 *Mathematics Subject Classification*: 11J70, 20F65, 22D40, 30E05, 37A15, 37A20, 37A30, 54H20, 60B15, **AMS members US\$86.40**, List US\$108, Order code CONM/669

New AMS-Distributed Publications

Algebra and Algebraic Geometry



Geometric Representations of the Braid Groups

Fabrice Castel, *Université de Bourgogne, Dijon, France*

Since the braid group and the mapping class group were defined in the first half of the last century, mathematicians have attempted, in vain, to compute the endomorphisms for both. In addition, each partial result in this direction has seemed to confirm a tight connection between the braid group and the mapping class group, without revealing the nature of this connection.

In this paper, the author changes the point of view: determining all the homomorphisms from the braid group to the mapping class group via Thurston's theory. He explains their geometric nature and shows that they are almost all embeddings.

Thanks to these new results, the author has found answers to these questions in a unified way.

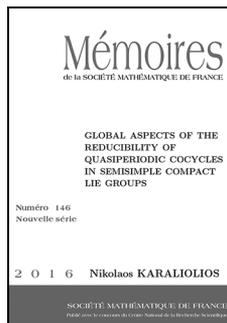
This item will also be of interest to those working in geometry and topology.

A publication of the Société Mathématique de France, Marseilles (SMF), distributed by the AMS in the U.S., Canada, and Mexico. Orders from other countries should be sent to the SMF. Members of the SMF receive a 30% discount from list.

Astérisque, Number 378

May 2016, 175 pages, Softcover, ISBN: 978-2-85629-835-0, 2010 *Mathematics Subject Classification*: 20F38, 57M07; 57M99, 20F36, 20E36, 57M05, **AMS members US\$53.60**, List US\$67, Order code AST/378

Analysis



Global Aspects of the Reducibility of Quasiperiodic Cocycles in Semisimple Compact Lie Groups

Nikolaos Karaliolios, *Université Paris Diderot, France*

In this memoir, the author studies quasiperiodic cocycles in semi-simple compact Lie groups. For most of his study, he focuses on one-frequency cocycles. He proves that C^∞ -reducible cocycles are dense in the C^∞ topology, for a full measure set of frequencies. Moreover, he shows that every cocycle (or an appropriate iterate of it, if homotopy appears as an obstruction) is almost torus-reducible (i.e. can be conjugated arbitrarily close to cocycles taking values in an abelian subgroup of G).

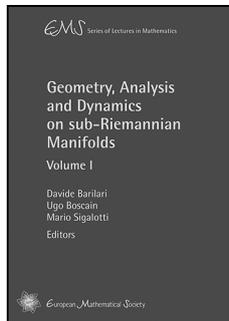
In the course of the proof, the author first defines two invariants of the dynamics, which he calls *energy* and *degree* and which give a preliminary distinction between (almost-)reducible and non-reducible cocycles. He then takes up the proof of the density theorem and shows that an algorithm of renormalization converges to perturbations of simple models, indexed by the degree. Finally, the author analyzes these perturbations using methods inspired by KAM theory.

A publication of the Société Mathématique de France, Marseilles (SMF), distributed by the AMS in the U.S., Canada, and Mexico. Orders from other countries should be sent to the SMF. Members of the SMF receive a 30% discount from list.

Mémoires de la Société Mathématique de France, Number 146

May 2016, 200 pages, Softcover, ISBN: 978-2-85629-832-9, 2010 *Mathematics Subject Classification*: 37C55, 37C05, **AMS members US\$53.60**, List US\$67, Order code SMFMEM/146

Geometry and Topology



Geometry, Analysis and Dynamics on sub-Riemannian Manifolds: Volume I

Davide Barilari, *Université Paris-Diderot, France*, **Ugo Boscain**, *École Polytechnique, Palaiseau, France*, and **Mario Sigalotti**, *École Polytechnique, Palaiseau, France*, Editors

Sub-Riemannian manifolds model media with constrained dynamics: motion at any point is allowed only along a limited set of directions, which are prescribed by the physical problem. From the theoretical point of view, sub-Riemannian geometry is the geometry underlying the theory of hypoelliptic operators and degenerate diffusions on manifolds.

In the last twenty years, sub-Riemannian geometry has emerged as an independent research domain, with extremely rich motivations and ramifications in several parts of pure and applied mathematics, such as geometric analysis, geometric measure theory, stochastic calculus and evolution equations together with applications in mechanics, optimal control and biology.

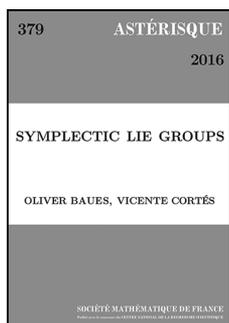
The aim of the lectures collected here is to present sub-Riemannian structures for the use of both researchers and graduate students.

This item will also be of interest to those working in differential equations.

A publication of the European Mathematical Society (EMS). Distributed within the Americas by the American Mathematical Society.

EMS Series of Lectures in Mathematics, Volume 24

June 2016, 332 pages, Softcover, ISBN: 978-3-03719-162-0, 2010 *Mathematics Subject Classification*: 53C17, 35H10, 60H30, 49J15, **AMS members US\$46.40**, List US\$58, Order code EMSSERLEC/24



Symplectic Lie Groups

Oliver Baues, *Georg-August-Universität Göttingen, Germany*, and **Vicente Cortés**, *Universität Hamburg, Germany*

The authors develop the structure theory of symplectic Lie groups based on the study of their isotropic normal subgroups.

This book consists of three main parts. In the first part, the authors show that every symplectic Lie group admits a sequence of subsequent symplectic reductions to a unique irreducible symplectic Lie group. In the second part, they address the symplectic geometry of cotangent symplectic Lie groups and the theory of Lagrangian extensions of flat Lie groups. In the third part, they analyze the

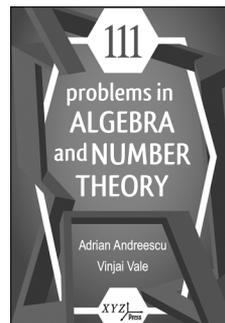
existence problem for Lagrangian normal subgroups in nilpotent symplectic Lie groups.

A publication of the Société Mathématique de France, Marseilles (SMF), distributed by the AMS in the U.S., Canada, and Mexico. Orders from other countries should be sent to the SMF. Members of the SMF receive a 30% discount from list.

Astérisque, Number 379

May 2016, 96 pages, Softcover, ISBN: 978-2-85629-834-3, 2010 *Mathematics Subject Classification*: 53C30; 22E25, 53D20, **AMS members US\$41.60**, List US\$52, Order code AST/379

Math Education



111 Problems in Algebra and Number Theory

Adrian Andreescu, *AwesomeMath, Plano, TX*, and **Vinjai Vale**, *Phillips Exeter Academy, NH*

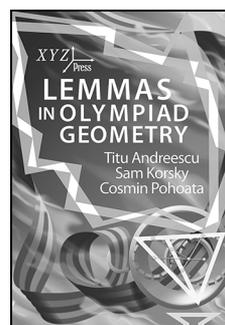
Algebra plays a fundamental role in math and science and provides a uniform language with which we can express mathematical concepts. The field of number theory also relies heavily on algebraic machinery. This book provides the strong foundation in algebra and number theory necessary to master other mathematical disciplines. The authors cover the fundamentals of their own areas of mathematics and discuss important techniques and strategies that frequently arise in junior-level Olympiad problems.

This item will also be of interest to those working in general interest.

A publication of XYZ Press. Distributed in North America by the American Mathematical Society.

XYZ Series, Volume 18

May 2016, 230 pages, Hardcover, ISBN: 978-0-9968745-0-2, 2010 *Mathematics Subject Classification*: 00A07, 97D50, 97U40, **AMS members US\$47.96**, List US\$59.95, Order code XYZ/18



Lemmas in Olympiad Geometry

Titu Andreescu, *University of Texas at Dallas, Richardson, TX*, **Sam Korsky**, *Massachusetts Institute of Technology, Cambridge, MA*, and **Cosmin Pohoata**, *California Institute of Technology, Pasadena, CA*

This book showcases the synthetic problem-solving methods which frequently appear in modern-day Olympiad geometry and makes them accessible even to readers with little familiarity in the subject. Each chapter is presented as a short story of its own and includes

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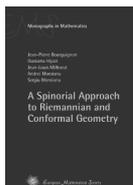
European Mathematical Society

**3-MANIFOLD GROUPS**

Matthias Aschenbrenner, *University of California, Los Angeles, CA*, **Stefan Friedl**, *Universität Regensburg, Germany*, and **Henry Wilton**, *University of Cambridge, United Kingdom*

This book summarizes developments made in the field and provides an exhaustive account of the current state of the art of 3-manifold topology, especially focusing on the consequences for fundamental groups of 3-manifolds.

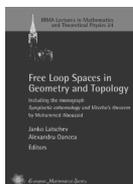
EMS Series of Lectures in Mathematics, Volume 20; 2015; 230 pages; Softcover; ISBN: 978-3-03719-154-5; List US\$48; AMS members US\$38.40; Order code EMSERLEC/20

**A SPINORIAL APPROACH TO RIEMANNIAN AND CONFORMAL GEOMETRY**

Jean-Pierre Bourguignon, *Institut des Hautes Etudes Scientifiques, Bures-sur-Yvette, France*, **Oussama Hijazi**, *Université de Lorraine, Vandœuvre-lès-Nancy, France*, et al.

The book gives an elementary and comprehensive introduction to Spin Geometry, with particular emphasis on the Dirac operator, which plays a fundamental role in differential geometry and mathematical physics.

EMS Monographs in Mathematics, Volume 6; 2015; 462 pages; Hardcover; ISBN: 978-3-03719-136-1; List US\$87; AMS members US\$69.60; Order code EMSMONO/6

**FREE LOOP SPACES IN GEOMETRY AND TOPOLOGY**

INCLUDING THE MONOGRAPH "SYMPLECTIC COHOMOLOGY AND VITERBO'S THEOREM"

Fabrice Baudoin, *Purdue University, West Lafayette, IN*

This book facilitates communication between topologists and symplectic geometers thinking about free loop spaces and also begins to explore the new directions of research that have emerged recently.

IRMA Lectures in Mathematics and Theoretical Physics, Volume 24; 2015; 500 pages; Hardcover; ISBN: 978-3-03719-153-8; List US\$87; AMS members US\$69.60; Order code EMSILMTP/24

**TEMPERED HOMOGENEOUS FUNCTION SPACES**

Robert J. Marsh, *University of Leeds, United Kingdom*

This book deals with homogeneous function spaces of Besov–Sobolev type within the framework of tempered distributions in Euclidean n -space based on Gauss–Weierstrass semi-groups.

EMS Series of Lectures in Mathematics, Volume 21; 2015; 143 pages; Softcover; ISBN: 978-3-03719-155-2; List US\$38; AMS members US\$30.40; Order code EMSERLEC/21

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New AMS-Distributed Publications

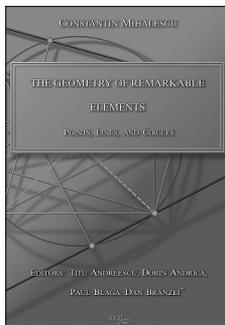
numerous solved exercises with detailed explanations and related insights to assist the reader on this journey.

This item will also be of interest to those working in general interest.

A publication of XYZ Press. Distributed in North America by the American Mathematical Society.

XYZ Series, Volume 19

May 2016, 369 pages, Hardcover, ISBN: 978-0-9885622-3-3, 2010 *Mathematics Subject Classification*: 00A07, 97D50, 97U40, **AMS members US\$55.96**, List US\$69.95, Order code XYZ/19

**The Geometry of Remarkable Elements: Points, Lines and Circles**

Constantin Mihalescu

Edited by **Titu Andreescu**, *University of Texas at Dallas*, **Dorin Andrica** and **Paul Blaga**, *Babeş-Bolyai University, Cluj-Napoca, Romania*, and **Dan Brănzei**

This book is an English translation of a text written by Constantin Mihalescu, a retired artillery colonel and enthusiastic amateur mathematician. It contains a comprehensive collection of the most important properties of points, lines, and circles related to triangles and quadrilaterals, as they were known by the mid-1950s, and a rich assortment of problems to entice and inspire readers of all levels. Topics covered include the nine-point circle, the Simson line, the orthopolar triangles, the orthopole, the Gergonne and Nagel points, the Miquel point and circle, the Carnot circle, the Brocard points, the Lemoine point and circles, the Newton–Gauss line, and much more.

This item will also be of interest to those working in general interest.

A publication of XYZ Press. Distributed in North America by the American Mathematical Society.

XYZ Series, Volume 17

May 2016, 580 pages, Hardcover, ISBN: 978-0-9968745-1-9, 2010 *Mathematics Subject Classification*: 00A07, 97D50, 97U40, **AMS members US\$71.96**, List US\$89.95, Order code XYZ/17